Objective 4.2: Create and manage PivotTables

As mentioned at the beginning of this chapter, Excel comes with some powerful tools that can help you analyze the hundreds—or perhaps thousands—of records that can be contained in a table or external database. One of the most powerful of these data analysis tools is the PivotTable. You can use this tool to summarize hundreds of records in a concise tabular format. You can then manipulate the layout of the table to see different views of your data.

In the simplest case, PivotTables work by summarizing the data in one field (called a *data field*) and breaking it down according to the data in another field. The unique values in the second field (called the *row field*) become the row headings. For example, consider a workbook that has a table of sales by sales representatives that also includes columns for the region and quarter. With a PivotTable, you can summarize the numbers in the Sales field (the data field) and break them down by Region (the row field). In the resulting PivotTable (on a second worksheet), Excel uses the unique items in the Region field (for example, East, Midwest, South, and West) as row headings.

	B	C	D	E		A	B	C
	Region ▾	Quarter ▾	Sales Rep ▾	Sales ▾	1			
	East	1st	Steven Buchanan	$192,345	2			
	West	1st	Michael Suyama	$210,880	3		Region ▾	Sum of Sales
	East	1st	Margaret Peacock	$185,223	4		East	$1,463,655
	South	1st	Janet Leverling	$165,778	5		Midwest	$1,365,215
	Midwest	1st	Anne Dodsworth	$155,557	6		South	$1,409,544
	South	1st	Nancy Davolio	$180,567	7		West	$1,477,884
	West	1st	Laura Callahan	$200,767	8		Grand Total	$5,716,298
	Midwest	1st	Andrew Fuller	$165,663	9			
	East	2nd	Steven Buchanan	$173,493	10			
	West	2nd	Michael Suyama	$200,203	11			
	East	2nd	Margaret Peacock	$170,213	12			
	South	2nd	Janet Leverling	$155,339	13			
	Midwest	2nd	Anne Dodsworth	$148,990	14			
	South	2nd	Nancy Davolio	$175,660	15			
	West	2nd	Laura Callahan	$190,290	16			
	Midwest	2nd	Andrew Fuller	$159,002	17			
	East	3rd	Steven Buchanan	$175,776	18			

Sales | Sales By Region | Quarterly Sales By Region ⊕   ◄ ► Sales | **Sales By Region** | ... ⊕

A PivotTable summarizes the data from the original table by showing total sales broken down by region
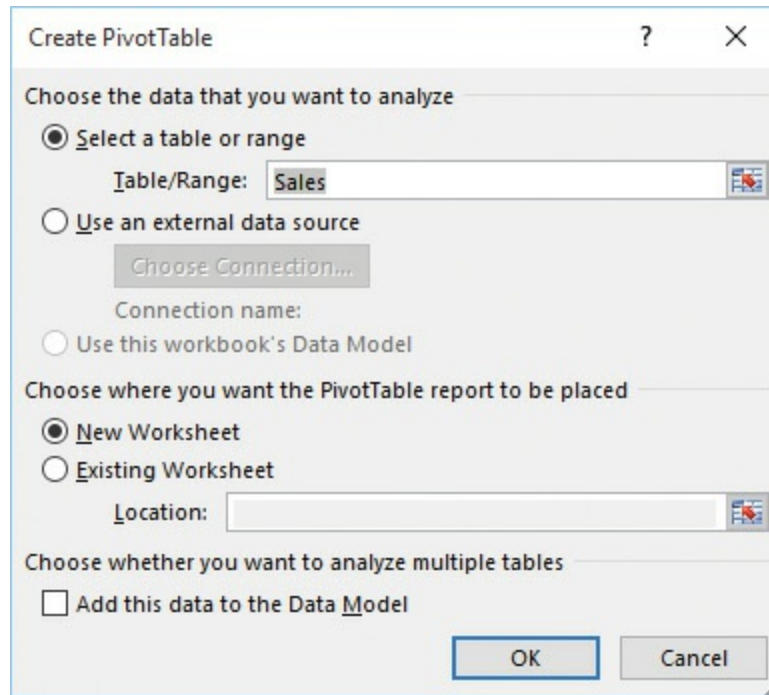
Create PivotTables

PivotTables look complex to build, but creating a basic PivotTable takes just a few steps. You can also build fancier PivotTables; Excel offers a wide range of options, styles, and features.

The most common source for a PivotTable is an Excel table, although you can also use data that's set up as a regular range. You can use just about any table or range to build a PivotTable, but the best candidates for PivotTables exhibit two main characteristics:

- At least one of the fields contains *groupable* data. That is, the field contains data with a limited number of distinct text, numeric, or date values. In the Sales worksheet example, the Region field is perfect for a PivotTable because, despite having dozens of items, it has only four distinct values: East, West, Midwest, and South.
- Each field in the list must have a heading.

Excel can also put together a PivotTable even if your source data exists in an external database (for example, a Microsoft Access or SQL Server database). If you have existing data connections on your system, you can use one of them as the data source. Otherwise, you can create a new connection as needed.

Create a PivotTable by using options in the Create PivotTable dialog box

You build a PivotTable visually by using the PivotTable Fields pane, which displays the available fields and offers four regions to which you can add one or more fields:

- **Rows** In this area, you specify the PivotTable's *row field*, which displays vertically the unique values from the field.

- **Columns** In this area, you specify the PivotTable's *column field*, which displays horizontally the unique values from the field.

- **Values** In this area, you specify the PivotTable's *data field*, which displays the results of the calculation that Excel applies to the field's numeric data.

- **Filters** In this area, you specify the PivotTable's *filter field*, which displays a drop-down list that contains the unique values from the field. When you select a value from the list, Excel filters the PivotTable results to include only the records that match the selected value.
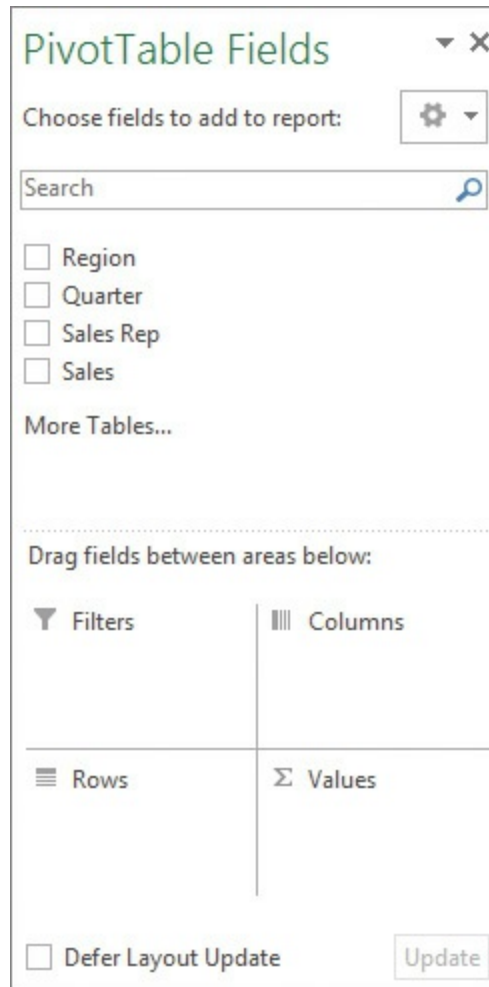
In the PivotTable Fields pane, you drag fields into some or all of the four areas: Rows, Columns, Values, and Filters

To create a PivotTable from an Excel table or range

1. Click inside the table or range.

2. On the **Insert** tab, in the **Tables** group, click **PivotTable** to open the Create PivotTable dialog box.

3. Click **Select a table or range**. The table name or the range address should already appear in the Table/Range box. If it does not, enter or select the table name or range address.

4. Below **Choose where you want the PivotTable report to be placed**, do either of the following:

  • Select **New Worksheet** (the default) to have Excel create a new worksheet for the PivotTable.

  • Select **Existing Worksheet** and then, in the **Location** box, enter or select the cell where you want to anchor the upper-left corner of the PivotTable.

5. Click **OK**. Excel displays the PivotTable Fields pane and two PivotTable Tools

tabs: Analyze and Design.

6. Add fields to the PivotTable by doing either of the following:

- In the **Choose fields to add to report** list, select the check box beside each field you want to add. Excel adds numeric fields to the Values area and text fields to the Rows area.

- Drag each field and drop it inside the area where you want the field to appear.

Tip

If you're using an exceptionally large data source, it might take Excel a long time to update the PivotTable as you add each field. If this is the case, select the Defer Layout Update check box, which tells Excel not to update the PivotTable as you add each field. When you're ready to see the current PivotTable layout, click Update.

To create a PivotTable from an external data source

1. On the **Insert** tab, in the **Tables** group, click **PivotTable** to open the Create PivotTable dialog box.

2. Select **Use an external data source**, and then click **Choose Connection**.

3. If the connection you want to use is listed, click it and then click **Open**. Otherwise, do the following:

    a. Click **Browse for More** to open the Select Data Source dialog box.

    b. Click **New Source** to start the Data Connection Wizard.

    c. Click the type of data source you want, and then click **Next**.

    d. Specify the data source. (The method depends on the type of data source. For SQL Server, you specify the server name and sign-in credentials; for an ODBC data source, such as an Access database, you specify the database file.)

    e. Select the database and table you want to use, and then click **Next**.

    f. Click **Finish** to complete the Data Connection Wizard.

4. Below **Choose where you want the PivotTable report to be placed**, select **New Worksheet** or **Existing Worksheet**.

5. Click **OK** to close the dialog box and go to the PivotTable.

6. Add fields to the PivotTable as described in the procedure "To create a PivotTable from an Excel table or range" earlier in this topic.

Modify PivotTable field selections and options

A PivotTable is a powerful data analysis tool because it can take hundreds or even thousands of records and summarize them into a compact, comprehensible report. But its usefulness goes beyond simple consolidation: unlike most of the other data-analysis features in Excel, a PivotTable is not a static collection of worksheet cells. Instead, you can move the fields to different parts of the PivotTable; sort the row, column, or data field; and filter the data to show only the items you want to view.

You can move a PivotTable's fields from one area of the PivotTable to another. By doing so, you can view your data from different perspectives, which can greatly enhance the analysis of the data. Moving a field within a PivotTable is called *pivoting* the data.

The most common way to pivot the data is to move fields between the row and column areas. If your PivotTable contains just a single nondata field, moving the field between the row and column areas changes the orientation of the PivotTable between horizontal (column area) and vertical (row area). If your PivotTable contains fields in both the row and column areas, pivoting one of those fields to the other area creates multiple fields in that area. For example, pivoting a field from the column area to the row area creates two fields in the row area.

When you create a PivotTable, Excel sorts the data in ascending order based on the items in the row and column fields. For example, if the row area contains the Product field, the vertical sort order of the PivotTable is ascending according to the items in the Product field. You can change this default sort order to one that suits your needs. Excel gives you two choices: you can switch between ascending and descending, or you can sort based on a data field instead of a row or column field.
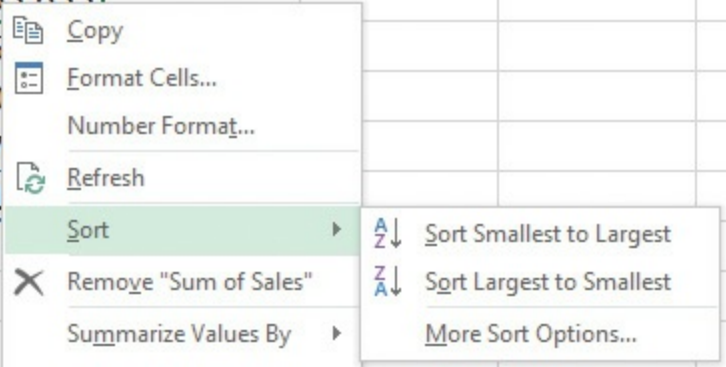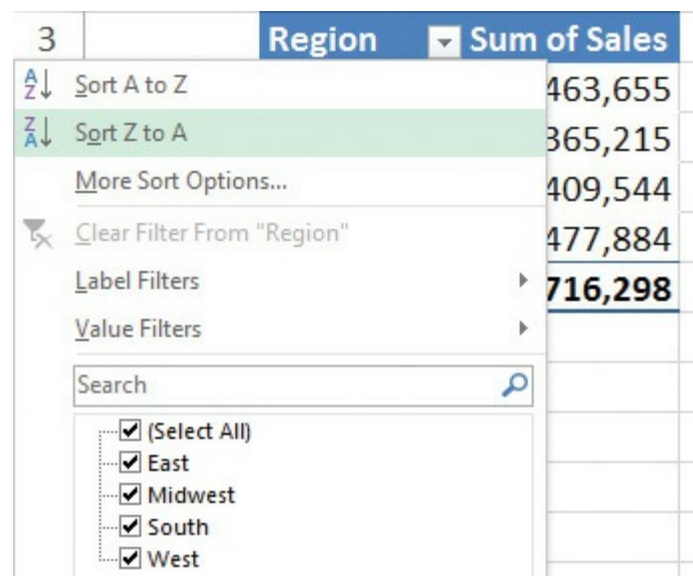

Clicking the arrow in a row or column field's header opens a menu of sort and filter options

Sorting the PivotTable based on the values in a data field is useful when you want to

rank the results. For example, if your PivotTable shows the sum of sales for each product, an ascending or descending sort of the product name enables you to easily find a particular product. However, if you are more interested in finding which products sold the most (or the least), you need to sort the PivotTable on the data field.


Right-clicking a data field displays a menu from which you can sort the results

By default, each PivotTable displays a summary for all the records in your source data. This is usually what you want to see. However, there might be situations in which you need to focus more closely on some aspect of the data. You can focus on a specific item from one of the source data fields by taking advantage of the PivotTable's filter field.

For example, suppose you are dealing with a PivotTable that summarizes data from thousands of customer invoices over some period of time. A basic PivotTable might tell you the total amount sold for each product that you carry. That is interesting, but what if you want to see the total amount sold for each product in a specific country/region? If the Product field is in the PivotTable's row area, you can add the Country/Region field to the column area. However, there might be dozens of countries/regions, so that is not an efficient solution. Instead, you can add the Country/Region field to the PivotTable filter. You can then have Excel display the total sold for each product for the specific country/region that you are interested in.
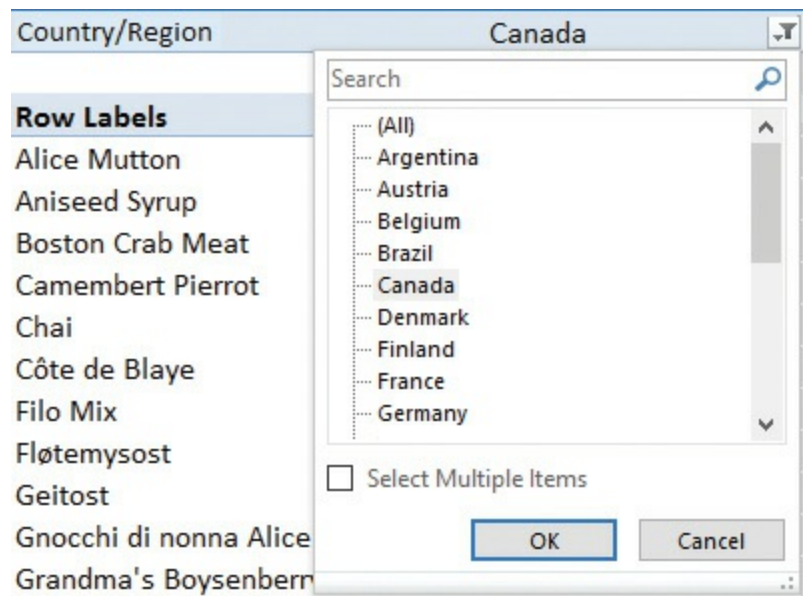
Clicking the arrow in the filter field header displays possible filter values

You can also filter a PivotTable by using a row or column field. In this case, Excel filters the PivotTable data to show only the row or column items that you add to the filter.
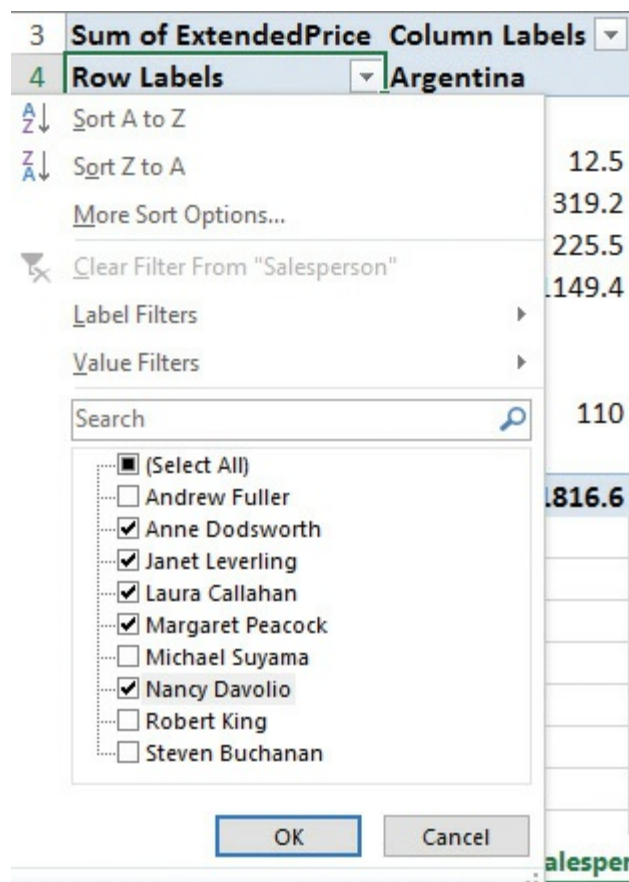
Clicking the arrow in the row or column field header displays possible filter values

To move a field to a different area

➡ In the **PivotTable Fields** pane, drag the field you want to move from its current area to the new area.

To sort a PivotTable by using a row or column field

1. In the field header for the row or column field you want to use for sorting, click the arrow.

2. Click the sort order you want to use, such as **Sort Z to A**.

To sort a PivotTable by using a data field

1. Right-click any cell in the data field.

2. In the menu, point to **Sort**, and then click the sort order you want to use, such as **Sort Largest to Smallest**.

To filter PivotTable data by using the filter field

1. In the field header for the PivotTable's filter field, click the arrow.

2. Do either of the following, and then click **OK** to return to the PivotTable:

• Click the item you want to use as the filter.

• To apply multiple filters, select the **Select Multiple Items** check box, and then click each item you want to include in the filter.

To filter PivotTable data by using a row or column field

1. In the field header for the PivotTable's row or column field, click the arrow.

2. Clear the check box beside each item you do not want to view, and then click **OK**.

Create slicers

So far in this chapter, you have learned how to filter a PivotTable either by using the filter field, which applies to the entire PivotTable, or by using row or column items, which apply only to that field. In both cases, the filter is usable only with the PivotTable in which it is defined. However, it is not unusual to require the same filter in multiple PivotTables. For example, if you are a sales manager responsible for sales in a particular set of countries/regions, you might often need to filter a PivotTable to show data from just those countries/regions. Similarly, if you work with a subset of your company's product line, you might often have to filter PivotTables to show the results from just those products.

Applying these kinds of filters to one or two PivotTables is not difficult or time

consuming, but if you have to apply the same filter over and over again, the process becomes frustrating and inefficient. To combat this, Excel offers a PivotTable feature called the *slicer*. A slicer is very similar to a filter field, except that it is independent of any PivotTable. This means that you can apply the same slicer to multiple PivotTables.
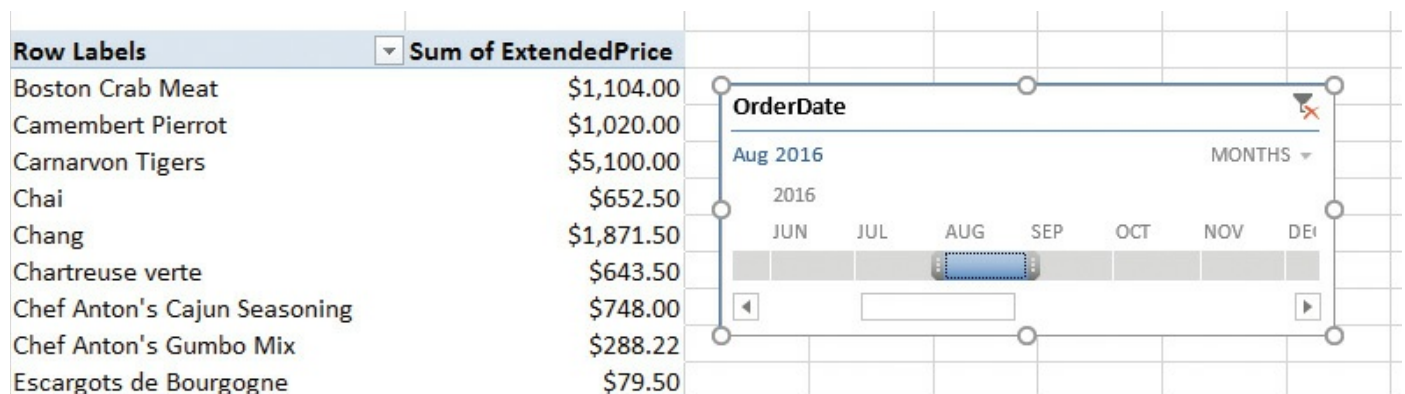
Row Labels	Sum of ExtendedPrice
Andrew Fuller	$57.50
Anne Dodsworth	$966.80
Janet Leverling	$8,922.35
Laura Callahan	$1,278.40
Margaret Peacock	$2,993.25
Michael Suyama	$1,078.00
Nancy Davolio	$6,807.19
Robert King	$9,194.56
Grand Total	**$31,298.05**

Country/Region

Argentina
Austria
Belgium
Brazil
Canada
Denmark
Finland
France

A slicer that applies a filter to any PivotTable that includes a Country/Region field

If your PivotTable includes one or more fields with dates, you can also create a *timeline slicer*, which displays a sliding timeline that you can use to select specific days, months, or years. Excel then filters the PivotTable to show the data only for the selected time value.

Row Labels	Sum of ExtendedPrice
Boston Crab Meat	$1,104.00
Camembert Pierrot	$1,020.00
Carnarvon Tigers	$5,100.00
Chai	$652.50
Chang	$1,871.50
Chartreuse verte	$643.50
Chef Anton's Cajun Seasoning	$748.00
Chef Anton's Gumbo Mix	$288.22
Escargots de Bourgogne	$79.50

OrderDate

Aug 2016   MONTHS

2016

JUN   JUL   AUG   SEP   OCT   NOV   DE

An example of a timeline slicer

To create and apply a slicer

1. Click a cell in a PivotTable that contains the field for which you want to create a slicer.

2. On the **Analyze** tab, in the **Filter** group, click **Insert Slicer** to open the Insert Slicers dialog box.

3. Select the check box beside each field for which you want to create the slicer,

and then click **OK**. Excel displays one slicer for each field you selected.

4. In the slicer, click a field item that you want to include in your filter. If you want to include multiple items in your filter, hold down **Ctrl** while you click each item. Excel filters the PivotTable based on the field items you select in each slicer.

To create and apply a timeline slicer

1. Click a cell in a PivotTable that contains the field for which you want to create a slicer.

2. On the **Analyze** tab, in the **Filter** group, click **Insert Timeline** to open the Insert Timelines dialog box.

3. Select the check box beside each field for which you want to create a timeline slicer, and then click **OK**. Excel displays one timeline for each field you selected.

4. In the timeline's list, select a time unit: **Years**, **Quarters**, **Months**, or **Days**.

5. Click the time period you want to view. Excel filters the PivotTable based on the time period you select in each timeline.

Group PivotTable data

Most PivotTables have just a few items in the row and column fields, which makes the PivotTable easy to read and analyze. However, it is not unusual to have row or column fields that consist of dozens of items, which makes the PivotTable much more unwieldy. To make a PivotTable with a large number of row or column items easier to work with, you can group the items together. For example, you could group months into quarters, thus reducing the number of items from 12 to 4. Similarly, a PivotTable that lists dozens of countries/regions could group those countries/regions by continent, thus reducing the number of items to four or five, depending on where the countries/regions are located. Finally, if you use a numeric field in the row or column area, you might have hundreds of items, one for each numeric value. You can improve the PivotTable by creating just a few numeric ranges. In Excel, you can group three types of data: numeric, date and time, and text.

Grouping numeric values is useful when you use a numeric source for a row or column field. In Excel, you can specify numeric ranges into which the field items are grouped. For example, suppose you have a PivotTable of invoice data that shows the extended price (the row field) and the salesperson (the column field). It would be useful to group the extended prices into ranges and then count the number of invoices each salesperson processed in each range.

Important

The ranges that Excel creates after you apply the grouping to a numeric field are not themselves numeric values; they are, instead, text values. Unfortunately, this means it is not possible to use the AutoSort feature in Excel to switch the ranges from ascending order to descending order, because Excel sorts the items as text, not as numbers.

Count of ExtendedPrice	Column Labels			
Row Labels	Andrew Fuller	Anne Dodsworth	Janet Leverling	Laura Callahan
0-1000	83	38	156	109
1000-2000	10	4	19	13
2000-3000	7	1	6	2
3000-4000		2	1	
4000-5000	1			
5000-6000	1			
6000-7000			1	
7000-8000			1	
8000-9000				
10000-11000				
Grand Total	102	45	184	124

A PivotTable grouped in ranges of 1,000 according to the numeric values in the row field.

If your PivotTable includes a field with date or time data, you can use the grouping feature in Excel to consolidate that data into more manageable or useful groups. For example, a PivotTable based on a list of invoice data might show the total dollar amount, which is the Sum Of Extended Price in the data area, of the orders placed on each day, which is the Date field in the row area. Tracking daily sales is useful, but a manager might need a PivotTable that shows the bigger picture. In that case, you can use the Grouping feature to consolidate the dates into weeks, months, or even quarters. You can even choose multiple date groupings. For example, if you have several years' worth of invoice data, you could group the data into years, the years into quarters, and the quarters into months.

Row Labels	Sum of ExtendedPrice
Qtr1	
Jan	$61,258.06
Feb	$38,483.63
Mar	$38,547.21
Qtr2	
Apr	$53,032.95
May	$53,781.28
Jun	$36,362.79
Qtr3	
Jul	$51,020.83
Aug	$47,287.66
Sep	$55,629.24
Qtr4	
Oct	$66,749.23
Nov	$43,533.79
Dec	$71,398.41
Grand Total	**$617,085.08**

A PivotTable grouped by quarters, and then by months, according to the date values in the row field

You can also group time data. For example, suppose you have data that shows the time of day that an assembly line completes each operation. If you want to analyze how the time of day affects productivity, you could set up a PivotTable that groups the data into minutes—for example, 30-minute intervals—or hours.

Finally, you can use the PivotTable Grouping feature to create custom groups from the text items in a row or column field. One common problem that arises when you work with PivotTables is that you often need to consolidate items, but you have no corresponding field in the data. For example, the data might have a Country/Region field, but what if you need to consolidate the PivotTable results by continent? It is unlikely that your source data includes a Continent field. Similarly, your source data might include employee names, but you might need to consolidate the employees according to the people they report to. What do you do if your source data does not include a Supervisor field?

The solution in both cases is to use the Grouping feature to create custom groups. For the country/region data, you could create custom groups named North America, South America, Europe, and so on. For the employees, you could create a custom group for each supervisor. You select the items that you want to include in a particular group, create the custom group, and then change the new group name to reflect its content.

Sum of ExtendedPrice	Column Labels			
Row Labels	Andrew Fuller	Anne Dodsworth	Janet Leverling	Laura Callahan
⊟ South America				
Argentina		12.5	319.2	225.5
Brazil	5524.4		3389.64	4983.6
Venezuela	1600.5	378	5866.84	4109.98
⊟ Europe				
Austria	6129.45	344	14595.45	5422.09
Denmark	1405.2		1684.27	48.75
Finland	5292.03	1590.56		4131.8
France	5279.51	1761	8907.52	3062.57
Germany	25984.1	7800.6	22430.68	11220.47
Ireland	2381.05	7403.9	2674.85	
Italy	3265.55	23.8	88	2078.86

A PivotTable grouped by continent according to the country/region names in the row field.
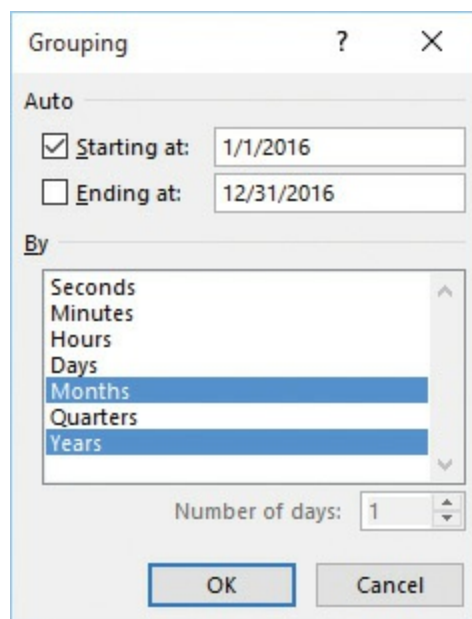
To group numeric data in a PivotTable

1. Click any item in the numeric field you want to group.

2. On the **Analyze** tab, in the **Group** section, click **Group Field** to open the Grouping dialog box.

3. Enter the starting and ending numeric values by doing one of the following:

  • In the **Starting at** box, enter the starting numeric value, and in the **Ending at** box, enter the ending numeric value.

  • Select either or both of the **Starting at** and **Ending at** check boxes to have Excel extract the minimum value and the maximum value, respectively, of the numeric items, and to place that value in the corresponding box.

4. In the **By** text box, enter the size you want to use for each grouping, and then click **OK** to return to the PivotTable.

In this version of the Grouping dialog box, you can set up your numeric groupings

To group date and time data in a PivotTable

1. Click any item in the date or time field you want to group, and open the **Grouping** dialog box.

2. Enter the starting and ending date or time values by doing one of the following:

   • In the **Starting at** box, enter the starting date or time value, and in the **Ending at** box, enter the ending date or time value.

   • Select either or both of the **Starting at** and **Ending at** check boxes to have Excel extract the minimum value and the maximum value, respectively, of the date or time items, and to place that value in the corresponding box.

3. In the **By** list, click the type of grouping you want. To use multiple groupings, click each type of grouping you want to use.

4. If you clicked only **Days** in step 3, in the **Number of days** box, specify the number of days to use as the group interval.

In this version of the Grouping dialog box, you can set up your date or time groupings.

5. Click **OK** to return to the PivotTable.

To group text data in a PivotTable

1. Select the items that you want to include in the group.

2. On the **Analyze** tab, in the **Group** section, click **Group Selection**. Excel creates a new group named Group*n* (where *n* means this is the *n*th group you have created) and restructures the PivotTable.

3. Click the group label, enter a new name for the group, and then press **Enter**. Excel renames the group.

4. Repeat steps 1 through 3 for the other items in the field until you have created all the groups you want.

Reference data in a PivotTable by using the GETPIVOTDATA function

What do you do when you need to include a PivotTable result in a regular worksheet formula? At first, you might be tempted just to include a reference to the appropriate cell in the PivotTable's data area. However, that works only if your PivotTable is static and never changes. In the vast majority of cases, the reference won't remain accurate because the addresses of the PivotTable values change as you pivot, filter, group, and refresh the PivotTable.

If you want to include a PivotTable result in a formula and you want that result to remain accurate even as you manipulate the PivotTable, use the GETPIVOTDATA function. This function uses the data field, PivotTable location, and one or more (row or column) field/item pairs that specify the exact value to use. Here's the syntax:

GETPIVOTDATA(data_field, pivot_table[, field1, item1...])

The following table describes the GETPIVOTDATA function arguments.

Argument	Description
data_field	The name of the PivotTable data field that contains the data you want
pivot_table	The address of any cell or range within the PivotTable, or a named range within the PivotTable
field1	The name of the PivotTable row or column field that contains the data you want
item1	The name of the item within *field1* that specifies the data you want

Note that you always enter the *field*n and *item*n arguments as a pair. If you don't include any field/item pairs, GETPIVOTDATA returns the PivotTable grand total. You can enter up to 126 field/item pairs. This might make GETPIVOTDATA seem like more work than it's worth, but the good news is that you'll rarely have to enter the GETPIVOTDATA function manually. By default, Excel is configured to generate the appropriate GETPIVOTDATA syntax automatically. That is, you start your worksheet formula, and when you get to the part where you need the PivotTable value, just click the value. Excel then inserts the GETPIVOTDATA function by using the syntax that returns the value you want.

| F5 | : | × | ✓ | fx | =GETPIVOTDATA("Extended Price",A3,"Country/Region","Argentina","Shipper","Federal Shipping") |

	A	B	C	D	E	F
2						
3	Sum of Extended Price	Column Labels ▾				
4	Row Labels ▾	Federal Shipping	Speedy Express	United Package	Grand Total	
5	Argentina	$1,197.80	$1,387.00	$3,717.70	$6,302.50	$1,197.80
6	Austria	$22,284.83	$23,089.38	$25,227.78	$70,601.99	
7	Belgium	$5,327.00	$295.38	$16,767.99	$22,390.37	

A formula that uses GETPIVOTDATA to reference a value in a PivotTable

To reference PivotTable data by using the GETPIVOTDATA function

→ Enter your formula up to the point where you want to insert the GETPIVOTDATA function, and then click the PivotTable data field value you want to use.

Add calculated fields

By default, Excel uses a Sum function for calculating the data field summaries. Although Sum is the most common summary function used in PivotTables, it's not the only one. Excel offers the 11 summary functions outlined in the following table.

Function	Description
Sum	Adds the values for the underlying data
Count	Displays the total number of values in the underlying data
Average	Calculates the average of the values for the underlying data
Max	Returns the largest value for the underlying data
Min	Returns the smallest value for the underlying data
Product	Calculates the product of the values for the underlying data
Count Numbers	Displays the total number of numeric values in the underlying data
StdDev	Calculates the standard deviation of the values for the underlying data, treated as a sample
StdDevp	Calculates the standard deviation of the values for the underlying data, treated as a population
Var	Calculates the variance of the values for the underlying data, treated as a sample
Varp	Calculates the variance of the values for the underlying data, treated as a population

You can use summary functions to create powerful and useful PivotTables, but they don't

cover every data analysis possibility. For example, suppose you have a PivotTable that uses the Sum function to summarize invoice totals by sales representative. That's useful, but you might also want to pay out a bonus to those representatives whose total sales exceed some threshold. You could use the GETPIVOTDATA function to create regular worksheet formulas to calculate whether bonuses should be paid and how much they should be (assuming each bonus is a percentage of the total sales).

However, this isn't very convenient. If you add sales representatives, you need to add formulas; if you remove sales representatives, existing formulas generate errors. And, in any case, one of the points of generating a PivotTable is to perform fewer worksheet calculations, not more. The solution in this case is to take advantage of the *calculated field* feature. A calculated field is a new data field based on a custom formula.

For example, if your invoice's PivotTable has an Extended Price field and you want to award a 5-percent bonus to those representatives who did at least $75,000 worth of business, you'd create a calculated field based on the following formula:

> =IF('Extended Price' >= 75000, 'Extended Price' * 0.05, 0)

Important

When you reference a field in your formula, Excel interprets this reference as the sum of that field's values. For example, if you include the logical expression 'Extended Price' >= 75000 in a calculated field formula, Excel interprets this as "Sum of 'Extended Price' >= 75000." That is, it adds the values in the Extended Price field together and then compares the result with 75000.

A slightly different PivotTable problem is when a field you're using for the row or column labels doesn't contain an item you need. For example, suppose your products are organized into various categories, such as Beverages, Condiments, Confections, and Dairy Products. Suppose further that these categories are grouped into several divisions —for example, Beverages and Condiments in Division A, and Confections and Dairy Products in Division B. If the source data doesn't have a Division field, how do you see PivotTable results that apply to the divisions?

One solution is to create groups for each division, as described earlier in this objective. That works, but Excel gives you a second solution: use calculated items. A *calculated item* is a new item in a row or column where the item's values are generated by a custom formula. For example, you could create a new item named *Division A* that is based on the following formula:

> =Beverages + Condiments

To change the data field summary calculation

1. Do either of the following:

- Right-click any cell inside the data field, and then point to **Summarize Values By** to display a partial list of the available summary calculations. If you see the calculation you want, click it; otherwise, click **More Options** to open the Value Field Settings dialog box.

- Click any cell in the data field. Then on the **Analyze** tab, in the **Active Field** group, click **Field Settings** to open the Value Field Settings dialog box.

2. In the **Summarize value field by** list, click the summary calculation you want to use. Then click **OK** to return to the worksheet.

To add a calculated field

1. Click any cell inside the data field.

2. On the **Analyze** tab, in the **Calculations** group, click **Fields, Items, & Sets** and then click **Calculated Field** to open the Insert Calculated Field dialog box.

3. In the **Name** box, enter a name for the calculated field.

4. In the **Formula** box, enter the formula you want to use for the calculated field.

Tip

If you need to use a field name in the formula, position the cursor where you want the field name to appear, click the field name in the Fields list, and then click Insert Field.

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5. Click **Add**, and then click **OK**.

To add a calculated item

1. Click any cell inside the row or column field to which you want to add the item.

2. On the **Analyze** tab, in the **Calculations** group, click **Fields, Items, & Sets** and then click **Calculated Item** to open the Insert Calculated Item In "*Field*" dialog box (where *Field* is the name of the field you're working with).

3. In the **Name** box, enter a name for the calculated item.

4. In the **Formula** box, enter the formula you want to use for the calculated item.

5. Click **Add**, and then click **OK**.

Format data

When you click any cell within a PivotTable, Excel displays the PivotTable Tools tool tabs, one of which is named *Design*. You can use the controls on the Design tool tab to perform six different PivotTable formatting tasks:

- **Configure subtotals** If you group your PivotTable values, you can configure the group subtotals to appear either at the bottom or the top of the group, or you can turn off the subtotals altogether.

- **Configure grand totals** You can set the PivotTable grand totals to appear for both rows and columns, for rows only, for columns only, or not at all.

- **Select a report layout** If you display more than one field in an area of the PivotTable, you can change the order of those fields if you want a different view of your report. When you have multiple fields in the row area, Excel displays each field in its own column, the field and subfield items all begin on the same row, and gridlines appear around every cell. This is called the *tabular layout* and is the default PivotTable layout. Excel also comes with two other report layouts that you can use. The *outline layout* also displays each field in its own column. However, the subfield items for each field item begin one row below the field item, and no gridlines appear around the cells (except for a single gridline under each item in the outer field). The *compact layout* displays each field in a single column. The subfield items for each field item begin one row below the field item and are indented from the left. No gridlines appear around the cells (except for a single gridline under each item in the outer field).

- **Add or remove blank rows** If you have multiple fields in the row or column area, you can elect to add a blank row between each item, which can often make the PivotTable easier to read.

- **Set PivotTable style options** You can turn on or off the PivotTable row headers, column headers, banded rows, and banded columns.

- **Apply a PivotTable style** A style is a collection of formatting options—fonts, borders, and background colors—that Excel defines for different areas of a PivotTable. For example, a style might use bold, white text on a black background for labels and grand totals, and white text on a dark blue background for items and data.

To format PivotTable data

1. Click any cell inside the PivotTable.

2. On the **Design** tab, in the **Layout** group, do any of the following:

   • Click **Subtotals**, and then click one of the options in the list.

- Click **Grand Totals**, and then click one of the options in the list.

- Click **Report Layout**, and then click one of the options in the list.

- Click **Blank Rows**, and then click one of the options to add or remove blank rows.

3. In the **PivotTable Style Options** group, select or clear the check boxes to turn the **Row Headers**, **Column Headers**, **Banded Rows**, and **Banded Columns** features on or off.

4. In the **PivotTable Styles** group, in the gallery, click a predefined style to apply it to the PivotTable.
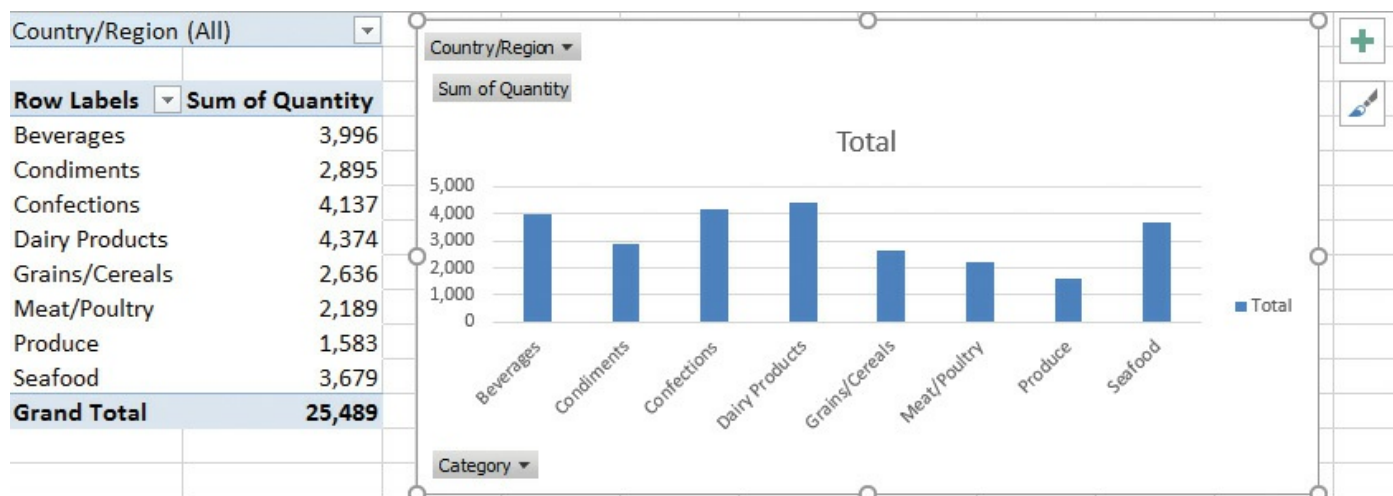
Objective 4.3: Create and manage PivotCharts

A PivotChart is a graphical representation of the values in a PivotTable. However, a PivotChart goes far beyond a regular chart, because a PivotChart has many of the same capabilities as a PivotTable. These capabilities include hiding items, filtering data by using the filter field, and refreshing the PivotChart to account for changes in the underlying data. Also, if you move fields from one area of the PivotTable to another, the PivotChart changes accordingly. You also have access to most of the regular charting capabilities in Excel, so PivotCharts are a powerful addition to your data-analysis toolkit.

Create PivotCharts

Excel offers three ways to create a PivotChart:

- You can create a PivotChart directly from an existing PivotTable. This saves time because you do not have to configure the layout of the PivotChart or any other options. When you use this method, Excel uses the default chart type for the data and places the PivotChart on a new chart sheet.

- You can create a PivotChart on the same worksheet as its associated PivotTable. That way you can easily compare the PivotTable and the PivotChart. This is called *embedding* the PivotChart on the worksheet.

- If the data you want to summarize and visualize exists as an Excel table or range, you can build a PivotChart directly from that data. Note, however, that Excel does not allow you to create just a PivotChart on its own. Instead, Excel creates a PivotTable and an embedded PivotChart at the same time. If you want to analyze your data by using both a PivotTable and a PivotChart, this method will save you time because it does not require any extra steps to embed the PivotChart along with the PivotTable.

Country/Region (All)	
Row Labels	**Sum of Quantity**
Beverages	3,996
Condiments	2,895
Confections	4,137
Dairy Products	4,374
Grains/Cereals	2,636
Meat/Poultry	2,189
Produce	1,583
Seafood	3,679
Grand Total	**25,489**

A PivotChart embedded on the same worksheet as its PivotTable

To create a PivotChart of the default type on a new sheet from a PivotTable

→ Click any cell in the PivotTable, and then press **F11**.

To embed a PivotChart on the same worksheet as a PivotTable

1. Click any cell in the PivotTable.

2. Do either of the following to open the Insert Chart dialog box:

- On the **Analyze** tab, in the **Tools** group, click **PivotChart**.
- On the **Insert** tab, in the **Charts** group, click the **PivotChart** button (not the arrow).

3. In the category list, click the chart type you want.

Important

You can't use charts in the XY (Scatter), Stock, Treemap, Sunburst, Histogram, Box And Whisker, Waterfall, or Funnel categories to create a PivotChart from a PivotTable.

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4. On the chart category page, click the chart subtype you want. Then click **OK** to close the dialog box and return to the worksheet.

To create a PivotChart from an Excel table or range

1. Click inside the table or range.

2. On the **Insert** tab, in the **Charts** group, click **PivotChart** to open the Create PivotChart dialog box.

3. Click **Select a table or range**. The table name or the range address should

already appear in the **Table/Range** box. If it does not, enter or select the table name or range address.

4. Do either of the following:

- Select **New Worksheet** (the default) to have Excel create a new worksheet for the PivotChart.

- Select **Existing Worksheet** and then, in the **Location** box, enter or select the cell where you want to anchor the upper-left corner of the PivotChart.

5. Click **OK**. Excel creates the PivotTable and PivotChart skeletons and displays the PivotTable Fields pane and three PivotChart Tools tabs: Analyze, Design, and Format.

6. Add the fields you want to the PivotTable. As you add each field, Excel updates both the PivotTable and the PivotChart.

Modify PivotCharts

By default, each PivotChart displays a summary for all the records in your source data. This is usually what you want to see. However, there might be situations where you need to focus more closely on some aspect of the data. You can do this by changing the PivotChart's row, column, and filter options:

- Click the row field button in the lower-left corner to sort the row items, apply a filter to the row items, or hide one or more row items.

- Click the column field button just above the chart legend to sort the column items, apply a filter to the column items, or hide one or more column items.

- Click the filter field button in the upper-left corner to apply one or more filters to the entire PivotChart.
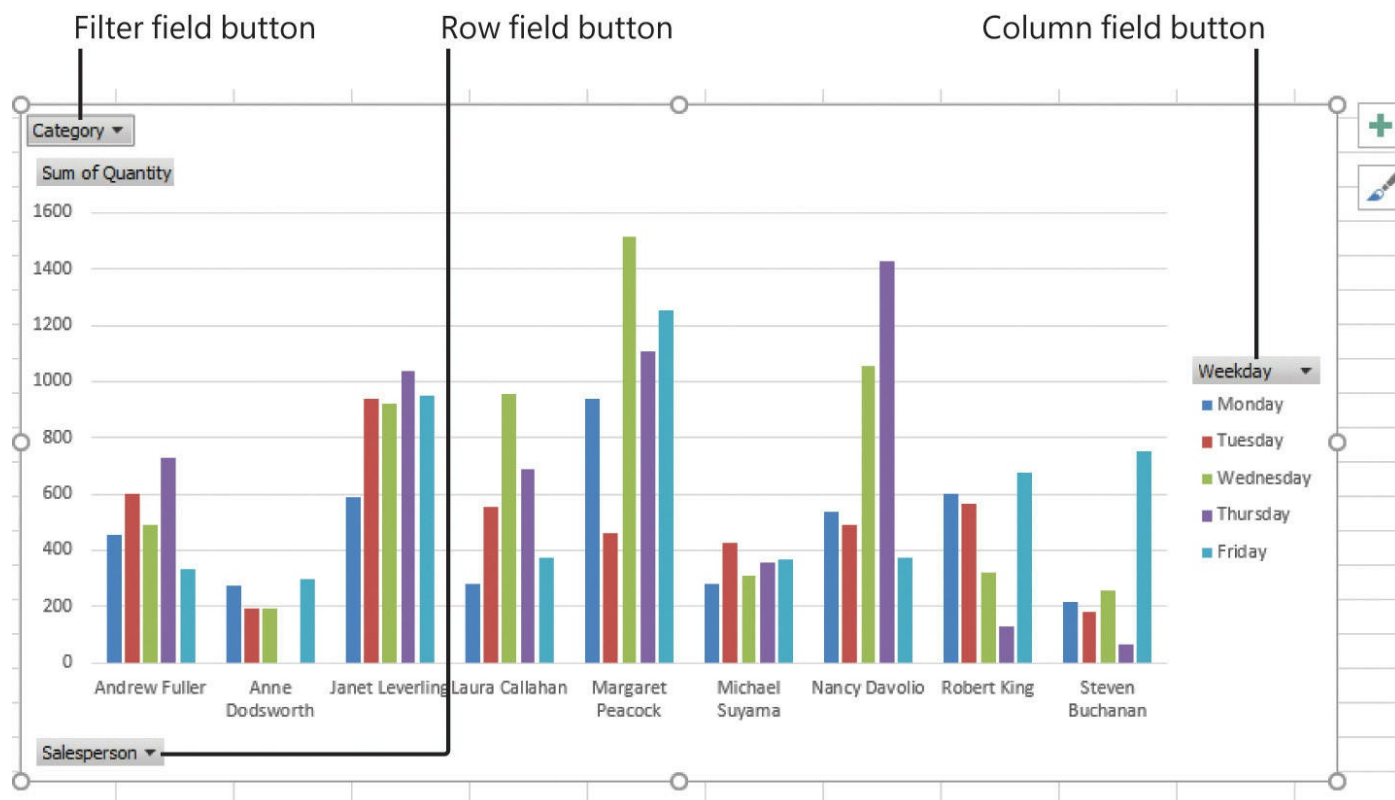
A PivotChart's row, column, and filter field buttons

When you select a PivotChart, the PivotChart tool tabs appear. The Design tool tab includes several options for changing the PivotChart style:

- **Adding chart elements** You can modify the chart by adding elements such as a chart title, axis titles, data labels, a data table, and gridlines.

- **Applying a predefined chart layout** Excel offers 11 preset chart layouts that you can use to quickly display titles, gridlines, and other chart elements.

- **Changing the chart colors** You can change the color scheme that Excel applies to the chart data markers.

- **Applying a chart style** Excel offers a number of predefined styles that control the chart's colors and effects.

- **Changing the chart data** You can switch the rows and columns, and you can change the PivotTable data source.

- **Changing the chart type** You can change the current chart type to any type that supports PivotCharts.

- **Moving the chart** You can move the PivotChart to a new sheet, or you can embed the PivotChart in a different worksheet.

To change the row, column, or filter options in a PivotChart

→ Click either the row field, column field, or report field button, and then select the

options you want to apply to the PivotChart.

To apply styles to a PivotChart

1. Select the PivotChart.

2. On the **Design** tab, do any of the following:

• In the **Chart Layouts** group, in the **Add Chart Elements** list, add one or more elements to the PivotChart.

• In the **Chart Layouts** group, in the **Add Quick Layout** list, apply a predefined chart layout.

• In the **Chart Styles** group, in the **Chart Styles** gallery, apply a predefined style to the PivotChart.

• In the **Data** group, click **Switch Row/Column** to switch the PivotChart's row and column fields.

• In the **Data** group, click **Select Data** to choose a different PivotTable as the PivotChart's data source.

• In the **Type** group, click **Change Chart Type** to apply a new chart type to the PivotChart.

• In the **Location** group, click **Move Chart** to move the PivotChart either to a new sheet or to an existing worksheet, as an embedded object.

Drill down into PivotChart details

By definition, both a PivotTable and a PivotChart are summaries of the underlying data. This means that each data point is the highest level in a hierarchy that can include many different levels. For example, you might have a PivotChart that summarizes invoice data by showing the total quantity sold for each product category. The category is the highest level of the hierarchy. One level down in the hierarchy might be the individual products that make up each category. An example of a multilevel hierarchy would be to break down the categories into the countries/regions in which the sales occurred, then the states/provinces, and then the cities.

You use the Show Detail dialog box to select the next level of the hierarchy you want to see for the selected data point. In the PivotChart, Excel expands the data point to show its underlying detail. Excel also offers the Collapse command, which you can use to move up the hierarchy to display fewer details.
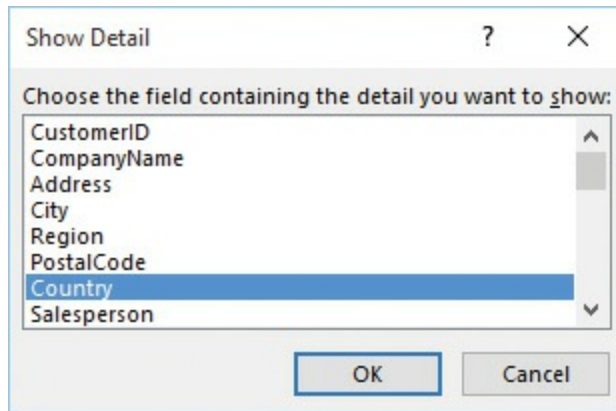
In a PivotChart, you can use the Show Detail dialog box to drill down into a data field value's details.

To drill down into a PivotChart's details

1. Right-click the data point you want to drill down into.

2. Click **Expand/Collapse**, and then click **Expand** to open the Show Detail dialog box.

3. Click the detail field you want to see, and then click **OK**.

To collapse a PivotChart's details

1. Right-click the data point you want to collapse, and then click **Expand/Collapse**.

2. Do one of the following:

- Click **Collapse** to collapse a single level.
- Click **Collapse Entire Field** to collapse all the details and see only the top level of the hierarchy.
- Click **Collapse to "*Field*"** to collapse all the details up to the field name specified by *Field*.